
FY 2000 Technology Deployment Titles

WSRC Facilities Disposition Division

[Click on Title for Deployment Fact Sheet Information](#)

3M EMPORE Membrane Separation Technology

Conveyorized Rad Monitor

Noise Cancellation Technology

Polyurea Coating for Encapsulation of Lead

Selion Nuclide Removal System (NURES)

Soft Media Blasting System

Vortex Amplifier



3M EMPORE Membrane Separation Technology

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: R Reactor Basin

Deployment Date: May 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy 1543
TMS ID Number:

Technology Effectiveness

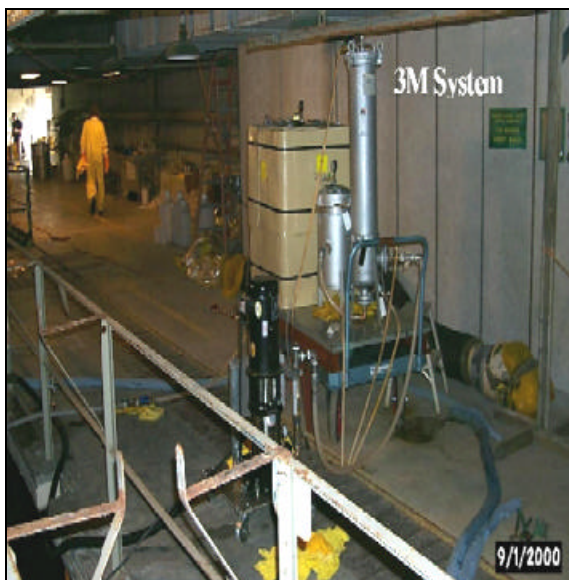
SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Much of the radionuclide-containing wastes that were left behind from nuclear weapons production exist in the aqueous form. Additional aqueous waste is continually being generated from groundwater remediation and decommissioning activities. Large volumes of contaminated water exist at various facilities at SRS (for example, fuel storage and disassembly basins). Current treatment of this water requires removal of the water from the basins and shipment to the F and H Area Effluent Treatment Facility (ETF). With the uncertainty of the integrity of the basins over time, a technology that can remove radioactive contamination from the water while minimizing secondary waste generation is essential to the success of the remediation of the reactor basins. A technology that is cost-effective and safe is needed to process the basin waters on location without transporting the water to ETF. The technology must reduce targeted nuclides to DOE release limits and condition water for direct release.

Technology Solution:

The Selective Separation Cartridge (TM), based on an innovative membrane technology developed by 3M with OST support, is designed to remove specific radionuclides in aqueous solutions at high flow rates. This is an efficient technology for the treatment of these wastes and is capable of removing various radionuclides to EPA drinking water standards.

The membrane, termed the WWLTM, is fabricated into a spiral-wound, cartridge-filter. The trademarked identification WWLTM is used to differentiate the cartridge membrane from an analytical sampling membrane designated EmporeTM, developed with OST support.

The membrane is unique in that it is made up of sorbent particles that are loaded or enmeshed onto a web or membrane. The cartridges are approximately 3 in. in diameter by 10 in. long and can be operated singly or in "nested" arrangement for higher flow rates. Several classes of materials have been successfully incorporated into the 3M membranes, including commercial ion-exchange materials, inorganic adsorbents, unique zeolite structures, and sophisticated macrocyclic molecular recognition compounds.

The SSC have the following characteristics:

- high separation efficiencies

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



3M EMPORE Membrane Separation Technology

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

- high radionuclide loading
- high flow rates
- fast reaction kinetics
- physical ruggedness
- compact size with small system footprint
- cost effective treatment

Membranes have been developed for removal of the following contaminants:

- Cs, Tc, Sr, Co, Pb, and Cu
- U and Pu (Under development for Phase III)

Benefits:

3M's selective separation membranes have several advantages over the baseline technology sorbent columns:

- Small, high surface-area, particles can be incorporated into membranes which increases capacity per unit volume (NOTE: particles of this size would result in unacceptable back-pressure if used in columns)
- Faster flow rate than standard ion exchange columns while achieving equal extraction efficiencies results in reduced decontamination time
- Channeling, which can be a severe limitation for columns, is absent in membrane type systems
- The footprint of the cartridge system is small compared to most columns
- Capital cost is significantly less than the baseline technology achieves superior level of decontamination
- Reduces volume of secondary wastes
- Flow rate for waste stream processing is much higher due to small particle size
- Immobilizes captured radionuclides onto cartridges that are easily handled and packaged for storage or further processing

(NOTE: The cost of any system is highly dependent on site conditions. Specifically, the presence of competing ions in a wastewater stream has a significant impact on the useful life of the system, which ultimately affects cost)

SRS Technology End User

Ghanasgyam (George) N. Mishra Org: DOE-SR
Savannah River Operations Office, P.O. Box A
Building 703-A, Room B208
Aiken, SC 29802 Beeper (803)725-7243 18237
Work Phone (803) 725-7239 Work Fax: (803)725-3616
george.mishra@srs.gov

SRS Technology User

John B. Pickett Org: WSRC
Savannah River Site
730-M, Room 143
Aiken, SC 29808 Beeper: (803)725-7243 14956
Work Phone: (803)725-3838 Work Fax: (803)725-4095
john.pickett@srs.gov



Conveyorized Rad Monitor

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: Decon Facility

Deployment Date: Sep 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy SRS1002
TMS ID Number:

Technology Effectiveness

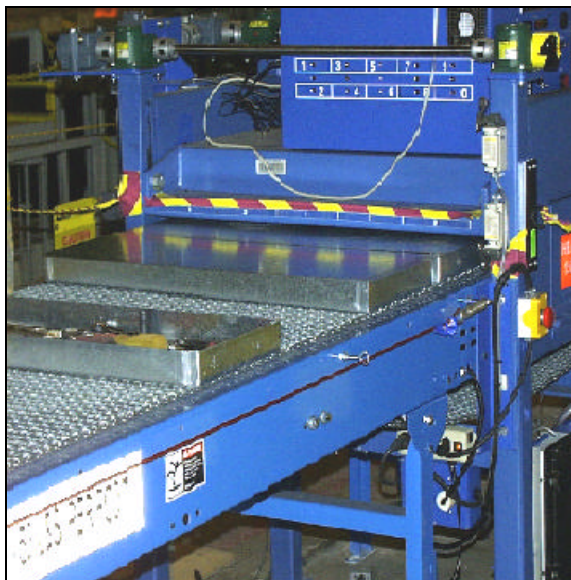
SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

A need for a tool to provide unrestricted release of decontaminated equipment at a fraction of the cost of conventional survey methods

Technology Solution:

The monitor, installed in FDD's Decon Facility in the C Area, is a beta-gamma monitor, but can be calibrated to survey selected waste streams previously contaminated with alpha, as long as they have a characteristic gamma signature. The conveyor allows several items to be monitored in a single pass through the monitoring device, thus saving a considerable amount of labor and associated cost.

Benefits:

The Conveyorized Monitor was put into initial operation in at the end of FY-99 and has already been used to "free release" close to 6,000 tools for reuse. When compared to the cost of conventional surveys to release these tools, the resultant savings is approximately \$ 30,000.

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



Conveyorized Rad Monitor

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Technology End User

Angelia D. Adams	Org: DOE-SR
Savannah River Operations Office, P.O. Box A	
Building 730-B, Room 2405	
Aiken, SC 29802	Beeper (803)725-7243 17422
Work Phone (803)952-8593	Work Fax: Not Available
angelia.adams@srs.gov	

SRS Technology User

Heatherly H. Dukes	Org: WSRC
Savannah River Site	
730-M, Room 137	
Aiken, SC 29808	Beeper: (803)725-7243 14096
Work Phone: (803)725-3771	Work Fax: (803)725-4095
heatherly.dukes@srs.gov	



Noise Cancellation Technology

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: Decon Facility

Deployment Date: Jul 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy SRS1022
TMS ID Number:

Technology Effectiveness

SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Excessive noise generated during decontamination activities resulting from a combination of both equipment and environmental conditions required regulating and shortening operator stay times. Regulating stay times to less than a standard operating shift increases waste generation from protective clothing and decreases operator efficiency.

Technology Solution:

The Decon Center adopted commercially available noise cancellation devices to increase operator productivity during aggressive decontamination processes. Traditional earmuffs/plugs employ passive dampening materials and are effective at absorbing higher frequency (>500 Hz) noises.

For noise in the 30-500 hertz frequency range that cannot be effectively attenuated with passive materials, active noise reduction technology is used. Designed for communication in high-noise settings, the SONEActive 3500 (TM) combines a comfortable, high-performance industrial earmuff with the added benefit of active low frequency noise reduction. The SONEActive 3500 (TM) improves communications on both ends - audibility of received speech is enhanced as a result of superior background noise reduction, and speech is transmitted more clearly through the noise canceling electret boom microphone. The SONEActive 3500 (TM) is designed to work with the latest radio models including Motorola and others.

SONEActive personal charger.

The power source for the SONEActive line is a rechargeable Ni-Cd battery module. The SONEActive personal charger provides an overnight charge which will last at least 12 hours. Each battery module will function for at least 500 recharging cycles.

SONEActive 3500 (TM) Performance

Active:

ANR- Up to 20dB attenuation of noise within a 30 to 500 Hz frequency bandwidth.

Passive:

NRR- 21dB*

Benefits:

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



Noise Cancellation Technology

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

Deployment of the noise cancellation muffs during extensive decontamination campaigns eliminated the need for mandatory operator stay times. Operator fatigue that results from wearing multiple pair of traditional noise dampening muffs/plugs was also reduced.

SRS Technology End User

Angelia D. Adams DOE-SR
Savannah River Operations Office, P.O. Box A

Beeper (803)725-7243 17422
Work Phone (803)952-8593
angelia.adams@srs.gov

SRS Technology User

WSRC

730-M, Room 146
Aiken, SC 29808
Work Phone: (803)725-1373 Work Fax: (803)725-4095
kevin.stoner@srs.gov



Polyurea Coating for Encapsulation of Lead

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: Decon Facility

Deployment Date: Mar 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy SRS1001

TMS ID Number:

Technology Effectiveness

SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Lead bricks and sheets used for radiation shielding increase personnel exposure to lead, increase personnel handling requirements, and frequently results in the generation of mixed waste.

Technology Solution:

The Decon Center adapted an industrial surface coating process to encapsulate the lead. A special polyurea coating, similar to that used for spray-on truck bed liners is applied to lead, over a primer that provides an initial sealant.

The primer allows the polyurea coating to be removed from the lead while still maintaining a protective sealant. It also

The encapsulation process:

- Does not affect the shielding capability of the lead,
- Provides a long-term protection from lead exposure to the worker, even when the lead is roughly handled,
- Reduces the OSHA lead protection handling requirements,
- Reduces generation of mixed waste, and
- Provides for cost effective recycling of the lead.

Since the removed coating passes the Toxicity Characteristic Leaching Procedure (TCLP) test, it can be disposed of as Low Level Radioactive Waste (LLW), not a mixed waste.

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



Polyurea Coating for Encapsulation of Lead

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Technology End User

Angelia D. Adams	DOE-SR
Savannah River Operations Office, P.O. Box A	
Building 730-B, Room 2405	
Aiken, SC 29802	Beeper (803)725-7243 17422
Work Phone (803)952-8593 Work Fax: Not Available	
angelia.adams@srs.gov	

SRS Technology User

Kevin J. Stoner	WSRC
Savannah River Site	
730-M, Room 146	
Aiken, SC 29808	Beeper: (803)725-7243 15284
Work Phone: (803)725-1373 Work Fax: (803)725-4095	
kevin.stoner@srs.gov	



Selion Nuclide Removal System (NURES)

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: R Reactor Basin

Deployment Date: May 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy 2937

TMS ID Number:

Technology Effectiveness

SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Large volumes of contaminated water exist at various facilities at SRS (for example, fuel storage and disassembly basins). A technology that is cost-effective and safe is needed to process the basin waters on location and selectively remove radioactive materials without transporting the water to be treated.

Technology Solution:

The Nuclide Removal System (NURES) technology uses ion exchange principles to selectively remove targeted radionuclides, providing more efficient treatment of contaminated liquids. The inorganic media selected for the R-Basin are CsTreatm and SrTreatm for removal of Cs-137 and Sr-90, respectively. The system at SRS will process 50 gpm of basin water. The water will be withdrawn for treatment and then returned to the basin to mix with the contaminated water, gradually lower the radionuclide concentration. This recycle operation will be repeated to treat five million gallons of contaminated water to meet release criteria. The mobile skid mounted treatment system is a modular package unit provided by Selion Technologies, Inc.

Benefits:

Reduce EM cleanup costs through waste treatment reduction as compared to current available technology.

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



Selion Nuclide Removal System (NURES)

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Technology End User

Angelia D. Adams	DOE-SR
Savannah River Operations Office, P.O. Box A	
Building 730-B, Room 2405	
Aiken, SC 29802	Beeper (803)725-7243 17422
Work Phone (803)952-8593 Work Fax: Not Available	
angelia.adams@srs.gov	

SRS Technology User

John B. Pickett	WSRC
Savannah River Site	
730-M, Room 143	
Aiken, SC 29808	Beeper: (803)725-7243 14956
Work Phone: (803)725-3838 Work Fax: (803)725-4095	
john.pickett@srs.gov	



Soft Media Blasting System

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: Decon Facility

Deployment Date: Jul 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy SRS1034
TMS ID Number:

Technology Effectiveness

SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Abrasive decontamination of leaded materials often results in secondary waste that must be processed as mixed waste. In addition, most abrasive cleaning methods generate airborne contaminants that require additional personnel respiratory protective measures.

Technology Solution:

Sponge Media is an open celled, polyurethane particle, impregnated with abrasives. The pliant nature of the sponge media allows its particles to flatten on impact, exposing the abrasive. After leaving the surface, the media constricts, pulling and entrapping most of what would have become airborne contaminants under most traditional blasting technologies. The Sponge media also is available impregnated with a variety of media with varying aggressiveness. By adjusting equipment parameters or media type, the blasting can be tailored to the material substrate, thus optimizing the removal of contaminants while minimizing removal of clean substrate.

Benefits:

Soft media blasting offers an alternative to traditional (i.e. grit or water) blasting techniques that results in minimal secondary waste generation. Airborne contaminant control helps reduce the levels of respiratory protection required by the equipment operator. For lead decontamination, minimizing the removal of clean lead can reduce the potential that secondary waste (i.e. sponge media) will be classified as a mixed waste.

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001



Soft Media Blasting System

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Technology End User

Angelia D. Adams	DOE-SR
Savannah River Operations Office, P.O. Box A	
Building 730-B, Room 2405	
Aiken, SC 29802	Beeper (803)725-7243 17422
Work Phone (803)952-8593 Work Fax: Not Available	
angelia.adams@srs.gov	

SRS Technology User

Kevin J. Stoner	WSRC
Savannah River Site	
730-M, Room 146	
Aiken, SC 29808	Beeper: (803)725-7243 15284
Work Phone: (803)725-1373 Work Fax: (803)725-4095	
kevin.stoner@srs.gov	



Vortex Amplifier

Savannah River Site Technology Deployment

WSRC Facilities Disposition Division

SRS Location: Decon Facility

Deployment Date: Sep 2000

Is this a SRS Baseline Technology?: No

Dept. of Energy SRS1035

TMS ID Number:

Technology Effectiveness

SRS Waste Stream:

Life-cycle Waste Stream Reduction:

Total Project Cost:

Life-cycle Savings:

Return on Investment:



Original Problem:

Ventilation systems used for contamination or hazardous material control during routine decontamination or outside maintenance activities must maintain the working area under vacuum. Normally, this ventilation control is achieved with manually operated valves. These mechanical flow control valves require routine maintenance or may "stick" and be unable to respond properly during upset or emergency conditions.

Technology Solution:

The Vortex Amplifier is a ventilation flow control valve with no moving parts that was developed and manufactured by AEA Technologies. The Decon Center demonstrated the ability of this device to maintain constant negative ventilation and prevent over-pressurization on a soft-sided containment hut during simulated upset conditions.

Benefits:

The Vortex Amplifier is a variable flow control box with no moving parts and therefore is not subject to mechanical failure and does not require maintenance. This device had previously been demonstrated and deployed for ventilation control in glove box or cell environments.

SRS Technology End User

Angelia D. Adams
Savannah River Operations Office, P.O. Box A
Building 730-B, Room 2405
Aiken, SC 29802
Beeper (803)725-7243 17422
Work Phone (803)952-8593 Work Fax: Not Available
angelia.adams@srs.gov

DOE-SR

SRS Technology User

Kevin J. Stoner
Savannah River Site
730-M, Room 146
Aiken, SC 29808
Beeper: (803)725-7243 15284
Work Phone: (803)725-1373 Work Fax: (803)725-4095
kevin.stoner@srs.gov

WSRC

Building Upon Office of Science and Technology Demonstration Success

Date of Issue: March 2001